the 26-in. refractor there. He suffered for some time from heart trouble, and his death was probably accelerated by a bad fall last spring. He married in 1885, and leaves a son and daughter.

### ALFRED LIONEL LEWIS.

WE regret to record the death of Mr. Alfred Lionel Lewis on October 22. Mr. Lewis, who was in his seventy-ninth year, joined the Anthropological Society of London in 1866, and was elected a member of its council in 1869. When the society was absorbed by the foundation of the Anthropological Institute in 1871, Mr. Lewis became a member of this body, of which at the time of his death he was one of the oldest members. He was elected a member of the council in 1876, and in 1886 he became treasurer, an office which he continued to hold for seventeen years. From 1905 to 1907 he served as vice-president. Mr. Lewis's interests were directed almost exclusively to archæology, and in particular to megalithic monuments, a subject on which he was for many years recognised, especially in France, as one of the foremost authorities. The great accuracy of his measured plans and drawings was not the least valuable feature in the numerous papers on this subject which he contributed to the Proceedings of the Anthropological Institute, the Prehistoric Congresses of France, the International Congresses on Prehistoric Archæology, the International Congress of Religions, and the British Association. He had already attained the fiftieth year of his membership of the last-named body, and had looked forward eagerly to taking part in 1921 in the celebration of the jubilee of the Royal Anthropological Institute.

THE death is announced, at the age of seventy-five, of DR. ANTON WEICHSELBAUM, emeritus professor of pathological anatomy in the University of Vienna. Soon after graduation, Weichselbaum became interested in pathology, and published work on the nature of rheumatoid arthritis. Before long he turned his attention to the then young science of bacteriology, and investigated the cause of pneumonia. About 1886, after a detailed investigation of a number of cases of this disease, he published a paper in which he described a coccus, the *Diplococcus pneumoniae,* as the causative organism, which corresponded with the organism previously described by Fraenkel. In 1887 his *magnum opus* appeared, on the discovery and description of the causal organism of cerebrospinal fever, the *Diplococcus intracellularis,* which is now almost universally accepted as the causative organism of this disease. In 1885 Weichselbaum succeeded Rokitansky in the chair of pathological anatomy, remaining on the active staff of the university until last year, when he was appointed emeritus professor. In 1912 he was installed as Rector Magnificus for the year, the highest honour in the gift of the university. Weichselbaum was a great investigator and a teacher of repute. In addition to numerous original papers and communications, he was the author of "Elements of Pathological Histology," which was translated into English.

THE death of MR. WILLIAM MELVILLE is recorded in *Engineering* for October 29 as having occurred on October 21. Mr. Melville was born in 1850, and served his pupilage with the North British Railway Co., under Mr. James Bell. He joined the Glasgow and South-Western Railway in 1874, and rose to be engineer-in-chief of the company, a position from which he retired in 1916. Mr. Melville was responsible for a large number of extensions and improvements on the railways and docks in Scotland, among which may be mentioned the widening of the City Union lines, Glasgow, which comprised the demolition of the old viaduct carrying the railway over the Clyde, and the substitution therefor of a new viaduct carrying four lines on the site of the old viaduct. He also extended St. Enoch Station, Glasgow, adding six new platforms to the six of the original station.

## Notes.

WE are glad to note that a movement is on foot to establish a memorial to the late Mr. W. Duddell, whose early death in November, 1917, deprived many of a valued friend and cut short a career of scientific research of great brilliance. Mr. Duddell's work on the recording of the wave-form of alternating currents, including the development of the oscillograph, had great influence on alternating current theory as well as on telephony, while his well-known researches on the electric arc led up to a large field of development in wireless telegraphy. The memorial is to take the form of a medal to be awarded periodically by the council of the Physical Society at its discretion to those who have advanced physical knowledge by the invention or design of scientific instruments or of materials used in their construction. If sufficient funds are available, it is also proposed to form a fund to be devoted to the foundation of scholarships or prizes to be awarded to students of the Physical Society under conditions to be determined by the council. We are sure that the many friends whom Mr. Duddell made among the members of the Institution of Electrical Engineers and of the Röntgen Society, of both of which he had been president, and of the Physical Society, of which he was for some years the treasurer, will be glad of the opportunity to support the scheme. An influential committee has been formed under the chairmanship of Sir William Bragg (president of the Physical Society). Mr. R. S. Whipple (president of the Optical Society) is acting as hon. secretary to the Duddell Memorial Fund, and subscriptions may be sent to him at 15 Creighton Avenue, Muswell Hill, N.10.

WITH the advice and assistance of the National Research Council of the United States, a co-operating group of scientific investigators of insect pests and plant diseases, together with representatives of leading industrial concerns engaged in the manufacture of chemicals and appliances used in fighting these enemies of crops, has been organised under the name of the Crop Protection Institute. This institute will undertake and support a series of thorough scientific studies of the crop pests themselves and of the means for improving and standardising the materials and appliances used in fighting them. The Board of Trustees of the institute is composed of nine scientific men representing leading organisations interested in crop protection and four representatives of the manufacturing and commercial interests. The temporary secretary is Mr. Harrison E. Howe, chairman of the Division of Research Extension of the National Research Council. The annual losses as a result of the attacks on growing and stored crops by insect pests and plant diseases are enormous, despite all that has been done to lessen them. A conservative estimate of the loss of wheat in the United States in a single recent year on account of the black-stem rust is 180,000,000 bushels, and this pest is but one of many that attack the wheat every year.

THE Federal Government of Australia, acting in response to representations which have been made to it, has taken steps for the preservation of the aborigines who are under its jurisdiction. It has been decided to set aside part of the State lands in the Northern Territories as a reservation for the tribes. This aboriginal reserve will include the Mann and Petersen Ranges and practically the whole of Lake Amadeus. Areas have also been set aside by the Governments of South and Western Australia in the adjoining districts for the purpose of this reserve. No intimation has been received that medical attention will be provided, but it is to be hoped that, if no step in this direction has been taken, some form of medical service may be instituted, as it is essential to the success of any scheme to preserve the aboriginal from extinction.

THE presidential address delivered by Sir Robert Hadfield to the ninth annual conference of the British Commercial Gas Association at Sheffield on October 19 has now been published. The address deals with a number of problems connected with increased production and with the economy of natural resources. True economy does not consist in the mere cutting down of expenditure; wise expenditure on improved working conditions, on modern plant, on research, and on education is more than ever necessary. Increased production demands economy of fuel, diminished cost per unit of production, and the better organisation and training of labour by scientific planning and direction of the details of operations. This would be accompanied by a decrease of strain on the workers rather than by an increase, owing to the elimination of unnecessarily fatiguing methods and the extension of the use of labour-saving machinery. The universal adoption of modern methods of obtaining heat and power would result in cheaper factory construction, economy of space, increased speed and trustworthiness of output, and decreased consumption of fuel. Tables are given to show the present state of the national industries, and also to compare gas, coal, and electric heating from the point of view of cost and consumption of coal in the heating and melting of steel. It is evident that for heating to moderate temperatures coal is the cheapest fuel; whilst for melting, producer gas is by far the most economical. Electric energy cannot compete with gas in cost, except for certain classes of work at very high temperatures. The author again directs attention to the necessity of applying scientific principles more thoroughly to the design of furnaces, and urges the desirability of a study of the important researches of Groume-Grjimailo on the flow of heated gases through a furnace.

THE Carnegie Corporation of New York some time ago made a gift of five million dollars to the American National Research Council and National Academy of Sciences, of which about one million dollars is to be devoted to the erection of a building in Washington to serve as the home of these two closely related scientific organisations. The remainder of the total sum is to serve as an endowment for the maintenance of the Council. A site for the building, comprising an entire block of land near the present Lincoln Memorial in Potomac Park, has just been obtained at a cost of about 200,000 dollars through gifts from about a score of generous individuals, most of whom are business men associated with great industrial concerns or generally interested in the promotion of American science. The National Research Council, which was organised during the war to aid the Government in mobilising the scientific resources of America, in both *personnel* and material, for attack on scientific problems connected with America's war-time activities, has now been reorganised on a peace-time basis as a permanent institution for the promotion of scientific research and the dissemination of scientific information. It is not a Government Department or Bureau, but is privately supported and wholly controlled by the co-operating scientific men of the country. The major part of its membership is composed of appointed representatives of about forty American major scientific and technical societies. Dr. George E. Hale, director of the Mount Wilson Solar Observatory, is the honorary chairman, and Dr. H. A. Bumstead, professor of physics at Yale University, is the active chairman for the present year. Dr. Vernon Kellogg, formerly of Stanford University, is the permanent secretary.

THE Institut International d'Anthropologie has been formally constituted, with a provisional council of direction, consisting of representatives of seventeen nationalities.

MR. ALAN A. CAMPBELL SWINTON, chairman of the council of the Royal Society of Arts, will deliver the inaugural address of the 167th session on Wednesday, November 17, at 8 p.m. His subject will be "Wireless Telegraphy and Telephony."

The annual general meeting of the National Union of Scientific Workers is to be held at King's College, Strand, on Saturday, November 13, at 2.30. An invitation to attend is extended to all scientific workers. The annual dinner of the union will take place in the evening of the same day.

The Stockholm correspondent of the *Morning Post* announces that the Nobel prize in medicine for 1919 has been awarded to Dr. Jules Bordet, chief of the Pasteur Institute, Brussels, and the same prize for 1920 to Prof. August Krogh, professor of physiology in the University of Copenhagen.

The Prince of Monaco has summoned a meeting of representatives of the Oceanographic Section of the International Union of Geodesy and Geophysics for January 25, 1921, at Paris. An extensive programme of the work to be undertaken by the Section will be submitted to this meeting.

A discussion on the African arc and meridian will be held in the rooms of the Royal Astronomical Society on Friday, November 5, at 5 p.m. The chair will be taken by Col. E. H. Hills. Col. H. G. Lyons will open the discussion, which will be continued by Sir Charles Close, Col. E. M. Jack, Mr. A. R. Hinks, Mr. C. G. T. McCaw, and probably Sir S. G. Burrard and Sir G. Lenox-Conyngham.

The British Motor Cycle and Cycle-car Research Association has been approved by the Department of Scientific and Industrial Research as complying with the conditions laid down in the Government scheme for the encouragement of industrial research. The association may be approached through Major H. R. Watling, "The Towers," Warwick Road, Coventry.

The Civil Service Commission of Canada announces the promotion of Mr. Arthur Gibson to the position of Dominion Entomologist and head of the Entomological Branch of the Dominion Department of Agriculture. Mr. Gibson has been Acting Dominion Entomologist since the death of Dr. C. Gordon Hewitt in February last.

The Institute of Industrial Administration, 110 Victoria Street, London, S.W.1, has among its objects "the general advancement of knowledge relative to the principles of industrial administration and their applications." The inaugural meeting was held on October 23, when an address on the industrial question was given by Viscount Haldane. Other meetings to be held are as follows:—November 9, The Influence of Exposed Records on Output, F. M. Lawson; November 23, Staff Selection and Promotion, E. W. Cousins; December 7, Road Transport as an Aid to Industrial Management, R. Twelvetrees; December 21, Standardisation of Rate-fixing Methods, J. E. Powell; January 11, 1921, The Measure of Output in Agriculture, W. J. Malden; and January 25, News and its Influence on Output, H. S. Rylands.

Mr. F. S. Spiers, secretary of the Faraday Society, was recently appointed by the King an Officer of the British Empire (O.B.E.), and reference was made to this honour at the opening of the joint meeting on the physics and chemistry of colloids described elsewhere in this issue. Mr. Spiers has been responsible for the organisation of the many valuable joint conferences arranged by the Faraday Society during Sir Robert Hadfield's presidency, and everyone who has attended any of them will be glad to know that his work has met with official recognition. He was secretary of the two British Scientific Products Exhibitions organised in 1918 and 1919 by the British Science Guild, and is secretary of the Institute of Physics, which there is every reason to believe will eventually occupy a very strong position among scientific bodies.

In recent notes in the *Astr. Nachr.* (No. 5047) and the Paris *Comptes rendus* (vol. clxxi., p. 520) Prof. Carl Störmer describes most interesting results from photographic observations made at seven stations in Norway on the height of a very brilliant aurora seen on the night of March 22–23 last. More than six hundred photographs were taken. Only some of the plates have been fully studied, but these give for the summits of some of the auroral rays heights *of the order of* 500 *km.* Prof. Störmer describes a unique corona, seen on March 23 about 3h. 45m. a.m. G.M.T., of "long blue rays of indescribable beauty." Of this he himself, at his station at Bygdo, near Christiania, obtained several photographs, but unfortunately by that time all his other stations had run out of plates. He is anxious to know whether anyone else obtained a photograph of the blue rays, as he thinks their height was probably quite exceptional.

The second reading of the British Empire Exhibition (Guarantee) Bill was carried in the House of Commons on November 1. The exhibition is to be held in London in 1923, and to be representative of the industries and resources of the British Empire. It will be privately organised, but has received official recognition and support. The King has given it his patronage, and the Prince of Wales is to be president of the General Committee. Under the Bill the Government proposes to guarantee the sum of 100,000*l.*, subject to private guarantees amounting to 500,000*l.* being forthcoming. As a condition of the guarantee, the Board of Trade is to approve the manager of the exhibition, the executive committee, and the general conditions under which the exhibition will be run, so that the Government may be in a position to secure that the exhibition is conducted with proper regard to economy and on lines which will ensure a success worthy of the object in view.

The usual winter courses of the Ecole d'Anthropologie began at Paris on November 3. Prof. Manouvrier's subject is the anthropological problems of heredity; Prof. Hervé's the regional ethnology of France and the conclusion of a study of crossings; Prof. Mahoudeau's the naturalists and philosophers of the eighteenth century, and the struggle against creationism; Prof. de Mortillet's labour, industry, and commerce among primitive peoples; Prof. Capitan's the most recent observations upon the megaliths of Brittany, upon Alsatian and Belgian prehistorics, and, generally, upon the architecture and art of prehistoric times; Prof. Schrader continues his teaching on the normal and abnormal relations of modern civilisation with natural laws; Prof. Papillault lectures on the psycho-sociology of art; Prof. Zaborowski on the ancient and modern peoples of Europe and America; Prof. Anthony on morphological determinism in biology; and Prof. Vinson on the languages of Europe. We miss the usual announcement of conferences.

PROF. ROGET in his third Chadwick lecture, delivered on Friday, October 29, dealt with the future activities in the civil community of the public health department of the League of Red Cross Societies. The work to be undertaken has been divided up among seven sections. The first is concerned with social diseases. The lecturer pointed out the difficulty of including these affections in Red Cross work; nevertheless, he is of opinion that science is bound to do its utmost to stamp out the "social evil." At the same time every moral and religious influence must also be brought to bear on the subject. The second section will deal with the prevention of tuberculosis. Prof. Roget stated that both preventive methods and the segregation of tuberculous persons must be employed in this work. The third section will be devoted to the prevention of malaria, chiefly by carrying out scientific changes which have been proved to be effective in the administration of areas in which the disease is rife. Child welfare and nursing will be the work of the fourth section. With the collaboration of the visiting nurse with the mother work can be done which is peculiarly suited to Red Cross organisations. Another section is concerned with preventive medicine; preventive service could be efficient only when a large number of Red Cross laboratories had been placed at the disposal of the medical practitioner. The seventh section would have the greatest task of all, that of education. Museums, lectureships, health libraries, and literature were all necessary, particularly in those countries in which hygiene, sanitation, and clean housing are neglected.

IN an important paper by Mr. A. L. Kroeber on "California Culture Provinces" (University of California Publications in Ethnology, vol. xvii., No. 27) the author dismisses the theory held by American ethnologists that California represents a well-defined culture area. This region falls more properly into three areas: northern, central, and southern. Of these the northern is part of the culture of the North Pacific coast, with its centre in British Columbia. In the south the foundation of everything is Mexican, but the culture has taken its peculiar shape and colour on the spot. What the author says of the south-west may be generally applied to the other regions: "The truth is that the south-west is too insuperably complex to be condensed into a formula or surrounded with a line on the map."

OBSERVERS of social life in India have long been aware that certain varieties of the sári or sheet are distinctive marks of caste. In the October issue of *Man* Mr. R. S. Nicholson describes some remarkable methods of ornamentation of the sári which prevail in the Cuddapa district of the Madras Presidency. New cloths, though they may have been previously procured, are assumed in the eighth month of the Telugu year, corresponding with October-November. Each type of cloth has a special border, indicating the god in whose honour the cloth is worn—a special colour for the Nága or snake god, the Mother goddesses, and so on. These special marks on women's cloths seem to be peculiar to Southern India, and, so far as has hitherto been observed, do not prevail in the north.

MUCH interest has lately been excited by the attempted breeding of a pair of bee-eaters in Scotland. These birds took up their quarters on a sandbank of the River Esk at Musselburgh, and it seemed at one time probable that they would succeed in rearing young. A full account of this attempt and its lamentable ending is given by Dr. Eagle Clarke in the September–October issue of the *Scottish Naturalist.*

THE *Philippine Journal of Science* (vol. xvi., No. 4) is devoted to an interesting and valuable survey of the avifauna and flora of the Philippines. The author, Mr. R. C. McGregor, gives a condensed but vividly written account of the various types of forest of this region in relation, on one hand, to their economic value, and, on the other, to the problems they present to the ecologist. He then proceeds to give a lively review of the birds of this area and their distribution in regard to the different types of forest, supplementing his observations by comparisons with other types of tropical forests in Africa and America. To naturalists at large this essay will prove supremely interesting and helpful. Furthermore, it is illustrated by a number of beautiful plates.

MEMOIRS of the Agricultural Department of India, Entomological Series, vol. v., No. 5 (May, 1920), deals with two destructive species of rice-leaf hoppers. This well-illustrated brochure by C. S. Misra emphasises the great damage done by these insects. In the Chhattisgarh Division of the Central Provinces in 1914 they were reported to have damaged 3,000,000 acres, causing a loss approximately of 14,000,000 rupees. From observations conducted on the habits of these insects it was ascertained that they have a strong predilection for light. In order to apply the use of light traps satisfactorily it was necessary that the cultivators should co-operate in the work, but the Chhattisgarhi ryot is both superstitious and lethargic. No amount of persuasion could induce him to go to his fields at night and light the lamps, owing to his innate dread of evil spirits. Among other methods the necessity for clean cultivation and the elimination of all grassy areas in the immediate vicinity of the paddy fields is emphasised. The use of large field-bags, 6 ft. long, 4 ft. broad, and 4 ft. deep, attached to a light bamboo frame is also advised. Each bag can be carried by two men at a walking pace and drawn through the fields when the plants are small. The inside of the bags should be smeared with kerosene in order to prevent the leaf-hoppers from escaping when once they are caught. The possibility of selecting immune varieties of paddy is a subject worth consideration, together with the relation of the ripening period to the incidence of the pests.

SEALING operations at the Pribilof Islands closed for the season on August 10, and the United States Bureau of Fisheries reports that telegraphic information has been received stating that a total of 25,978 pelts had been taken during this calendar year (*Science*, October 8). Of this number 21,936 were taken on St. Paul Island and the remainder on St. George Island; 721 of the pelts were from seals seven years of age or older. A by-products plant was in operation on St. Paul Island which produced some 1800 gallons of oil and 29,000 lb. of meat or fertiliser. These figures could have been exceeded if the Bureau had been able to obtain more labourers from the Aleutian Islands. Comments are made on the rumour that the United States Government intends to remove restrictions on pelagic sealing in the North Pacific Ocean and Bering Sea. North of the thirtieth parallel of north latitude, and in the seas of Bering, Kamchatka, Okhotsk, and Japan, pelagic seal-fishing is prohibited by an agreement entered into in 1911 by the United States, Great Britain, Russia, and Japan, which is in perpetuity unless one or more of the signatories dissent from it. This agreement has never been rescinded, and in face of the benefits which have been shown to accrue from the proper management of fur-seal herds—in the fiscal year 1920 the United States revenue from the sale of skins was 1,457,790 dollars, and Great Britain and Japan take shares of 15 per cent. each of the annual catch—there is no likelihood of the re-introduction of pelagic seal-fishing. The Alaskan herd is protected by the patrolling vessels of the United States and Canada working in co-operation.

The *Lancet* of October 23 contains an interesting account of an outbreak of Senecio disease, or cirrhosis of the liver due to Senecio poisoning, which occurred in the George district of Cape Province, Union of South Africa, in 1918. Dr. F. C. Willmot and Mr. G. W. Robertson, the authors of the article, state that the disease has been traced to the presence of the toxic seeds of *Senecio ilicifolius* and *Senecio Burchelli* in wheat harvested from fields in which these weeds were prevalent. They mention that precisely similar diseases (Molteno disease in South Africa, Winton's disease in New Zealand, and Pictou disease in Nova Scotia) have long been known in farm animals, especially horses, but they appear to be unaware that so long ago as 1911 Dr. H. E. Watt, working in the Imperial Institute laboratories, isolated from *Senecio latifolius*, the plant chiefly suspected of causing the disease in horses in South Africa, two toxic alkaloids, senecifoline and senecifolidine. These alkaloids were afterwards examined pharmacologically by Prof. Cushny, and found to produce hepatic cirrhosis in the animals used, the symptoms and post-mortem findings being identical in all respects with those recorded by the veterinary surgeons who have dealt with cases of Molteno, Winton's, or Pictou disease in South Africa, New Zealand, and Canada respectively. The outbreak now recorded by Dr. Willmot and Mr. Robertson is, however, probably the first instance of Senecio poisoning in human beings, and it raises the interesting question of the possible occurrence of cases in Europe, since *Senecio jacobaea*, the source of the disease in sheep in Nova Scotia, is a common weed in the United Kingdom and throughout Europe. In this country, however, the cleaning of wheat prior to its conversion into flour is probably so efficiently done that the risk is negligible.

Wandering storms form the subject of an article by Prof. A. McAdie, of Harvard University, in the *Geographical Review* for July last. The communication is for the most part based on Sir Napier Shaw's "Manual of Meteorology," part iv., published during the war, which discusses the relation of the wind to barometric pressure and the travel of cyclones. Prof. McAdie instances three unusual storm tracks dealt with by Sir Napier Shaw, and alludes to the need in forecasting of knowledge of recurving storms, with especial reference to the aviator and his long-distance flights. A remarkable instance is given by the author of the erratic travel of a disturbance from May 8 to June 6, 1910. This is tracked from the Strait of Juan de Fuca to the Grand Banks, when it is said to have recurved again and again, and to have come back to the Continent on May 26. It then merged with a storm that was moving north from Texas, and after meandering about to the east and north-east of Nova Scotia for ten days, until June 6, the disturbance dissipated.

The October issue of the *Abstracts and Papers* published by the Institution of Civil Engineers contains 300 abstracts occupying more than 200 pages, and an index of 12 pages. The necessity for such a publication if the results of foreign investigations are to be made available in the engineering industries of this country will be apparent to every reader. Taking the abstracts which deal with the uses and properties of concrete for structural purposes, we find that a five years' experience in Germany of the use of furnace-slag as a substitute for gravel and sand in concrete has shown that slag-concrete is stronger than concrete made of Rhine sand. The conditions under which Portland cement can be stored for a couple of years without the strength of the concrete made from it suffering have been investigated in America. In Germany a saving of 17 per cent. has been effected by the substitution of concrete for brick in workmen's dwellings. In South Africa the manufacture of large pipes of concrete by the centrifugal process has proved successful. In Belgium the best way of driving concrete piles without injury to them has been investigated; while the American Railway Engineers' Association has found concrete road-beds uniformly successful.

In the *Journal de Physique* for August last MM. H. Abraham, E. Bloch, and L. Bloch describe their direct-reading thermionic voltmeter which is manufactured by Carpentier. The invention of this instrument is a notable step in the development of the science of electrical measurement. Hitherto it has been impossible to get a direct-reading voltmeter which would read one volt of alternating pressure accurately. This instrument gives a direct reading for the ten-millionth part of an alternating volt. It consists of two thermionic amplifiers, followed by two thermionic valves in parallel, the "plate" current of which is measured by an ordinary direct-current milliammeter. With the help of this instrument the measurement of very minute alternating currents and pressures is as simple as everyday measurements with ordinary voltmeters and ammeters. By its use absolute measurements of inductances and capacities are made in a few minutes with a maximum inaccuracy of about 1 in 1000. By the use of suitable electrical "filters" very approximately sine-shaped waves are obtained by blocking out the disturbing harmonics. The authors have shown recently in the same journal how the frequency of the alternating currents can be determined with high accuracy. Its sensitiveness is shown by the fact that it can measure, by means of a direct reading of the pointer, the capacity of a sphere one millimetre in radius. The instrument has very many useful applications.

SOME comments on the statistics just issued by *Lloyd's Register* for the quarter ending on September 30 appear in *Engineering* for October 22. Before the war the merchant tonnage under construction in this country usually exceeded the total building in all other countries in the world; at present the tonnage building abroad exceeds our tonnage under construction by about 103,000 tons. At the end of September the vessels building in this country numbered 961 with a total gross tonnage of 3,731,098, an increase during the year of more than 32 per cent.; in comparison with the figure for September, 1913, the increase is more than 90 per cent. The individual tonnage in no case exceeds 25,000. With regard to the tonnage building abroad, the most noticeable feature is the decline in the tonnage building in the United States, where there are now only 312 vessels with an aggregate gross tonnage of 1,772,193 in hand, as compared with 767 vessels and a gross tonnage of 3,470,748 for the corresponding quarter of last year. Of the vessels now under construction, 114 with a total gross tonnage of 796,060 are intended for carrying oil in bulk. The United States is building 79 of these ships, and there are 32 building in the United Kingdom. Only five small steamers are being constructed of reinforced concrete in the United Kingdom, their total tonnage amounting to 2354; eleven vessels of this type are being built abroad, having a total tonnage of 24,069.

THE miscellaneous catalogue (No. 2, 1920) of second-hand books just issued by Mr. W. H. Robinson, 4 Nelson Street, Newcastle-upon-Tyne, contains nearly a thousand items, about two hundred of which deal with scientific subjects. The prices asked for the works appear very reasonable. The catalogue can be obtained upon application.

WE have received from the firm of Scientific Appliances, Southampton Row, W.C.1, a copy of its illustrated catalogue, which shows the apparatus available in two sections of the establishment. Section E contains electrical and magnetic apparatus, and fittings such as telephone sets, lighting sets, Wimshurst machines, accumulators, etc. Section O comprises optical appliances and drawing materials.

## Our Astronomical Column.

COMETS.—Dr. Kudara, who rediscovered Tempel's second comet last May, gives the following revised elements for it in *Popular Astronomy* for October. He also gives the corrected R.A. for the observation on May 25 last as 22h. 55m. 43·7s.:

$$T = 1920\ \text{June}\ 16{\cdot}196\ \text{G.M.T.}$$

$$\left.\begin{array}{l}\omega = 186^\circ\ 39'\ \ 0''\\ \Omega = 120^\circ\ 46'\ \ 5''\\ i = 12^\circ\ 45'\ 14''\\ \phi = 33^\circ\ 54'\ 21''\end{array}\right\}1920{\cdot}0$$

$$\mu = 687{\cdot}51''$$

$$\log a = 0{\cdot}47515$$

The period is the shortest of any known comet with the exception of that of Encke.

*Popular Astronomy* also contains the following elements of Borrelly's comet (1905 II.) deduced by Mr. F. E. Seagrave from observations on 1918 October 9 and December 6 and 1919 February 4:

$$T = 1918\ \text{Nov.}\ 16{\cdot}8632\ \text{G.M.T.}$$

$$\omega = 352^\circ\ 23'\ 32''$$

$$\Omega = 76^\circ\ 57'\ \ 2''$$

$$i = 30^\circ\ 29'\ 14''$$

$$\phi = 37^\circ\ 57'\ 11''$$

$$\mu = 514{\cdot}023''$$

$$\log a = 0{\cdot}559350$$

MOUNT WILSON OBSERVATIONS OF CAPELLA.—Some account of the remarkable observations of Capella as a double star at Mount Wilson, using interferometer methods on the 100-in. equatorial, was given in NATURE last April. The *Astrophysical Journal* for June contains further details; the theory of the interferometer is described by Mr. A. A. Michelson, while Mr. J. A. Anderson discusses the observations of Capella, and finds the orbit from observations on six days ranging from 1919 December 30 to 1920 April 23, combined with the spectroscopic data. The following are the adopted elements: Period = 104·006 days; periastron = Julian day 2422387·9; $a = 0{\cdot}05249'' =$ 130,924,000 km.; $e = 0{\cdot}016$; $i = 140^\circ\ 30'$; $\omega = 117{\cdot}3^\circ$; parallax = $0{\cdot}0600''$; masses of components in terms of sun, 4·62 and 3·65. These elements satisfy the observations with no error exceeding $0{\cdot}00004''$ in distance and 0·9° in position-angle, but the author points out that a longer series would probably show much larger residuals, since the interferometer multiplies the theoretical resolving power by $2\frac{1}{2}$ only.

From the close resemblance of the spectrum of one of the components with that of the sun it is probable that the surface brilliancy is much the same as the sun's, in which case the diameter of each star would be of the order of ten times that of the sun, or one-tenth of the distance between them. It is noted that the visual magnitudes of the two components must be very nearly the same, since the interference fringes completely vanished on superposition.

VARIATION IN THE LIGHT OF JUPITER.—A novel use of the photo-electric cell was made by Herr P. Guthnick at the Berlin-Babelsberg Observatory in an investigation as to whether the light of Jupiter showed any variation in the course of the planet's rotation owing to different markings being presented to us. In fact, last December and January there was a distinct variation having an amplitude of 0·14 magnitude. However, this rapidly diminished, and by February was only 0·04 magnitude. The author remarks that this rapid change gives support to the temporary variability in the light of Neptune in a period of eight hours observed by Prof. Hall and discussed in Monthly Notices, vols. xliv. and lxxv. Unfortunately, Neptune is too faint for observation with the photo-electric cell, otherwise a determination of its rotation-period might result.